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Two or thirty years ago there was little difficulty in defining analytical chemistry. Analytical chemists were then largely well restricted to the inorganic mineral type of analysis. The enormous advances that had been made in the analysis of organic materials, as in the Pregl techniques, were largely due to and in the hands of organic chemists. At the same time, advances in analytical chemistry were being made at a tremendous rate by the biochemists, but the analytical chemists in industry and in the universities had, unfortunately, but little part in it. Most research in analytical chemistry in our academic institutions was restricted to the fundamental techniques of gravimetric and titrimetric methods, although men like Furman, Kolthoff, Mellon, and Willard were beginning to expand the field of academic analytical research. It is less than a score of years since Nitchie's noteworthy paper on quantitative emission spectrography prophetically began the first issue of the ANALYTICAL EDITION in January 1929.

Today, it is difficult to define analytical chemistry precisely. As a first approximation, the subject may be limited to all techniques and methods for obtaining information regarding the composition, identity, purity, and constitution of samples of matter in terms of the kind, quantity, and groupings of atoms and molecules, as well as the determination of those physical properties and behavior which can be correlated with these objectives. Thus, analytical chemistry includes means of securing not only knowledge of the elemental composition, qualitative and quantitative, of materials but also a knowledge of the way the atoms are put together to form the molecular units as in the determination of organic functional groupings. While analytical chemistry does not include the use of x-ray diffraction in determining the unit cell of quartz, it does include the use of x-ray diffraction to determine the presence and amount of quartz in a sample of a dust or in a rock specimen.

Analysis may then be considered to be the application of analytical chemistry to obtaining qualitative and quantitative information about the nature of matter at the individual limit of the atomic level or higher.

Analytical chemists are those principally concerned with the design, planning, and systematizing of the field of analytical chemistry. As has often been emphasized, they must have, if not a working knowledge, at least an awareness of the applicability and limitations of methods, techniques, facts, and instruments from accumulators (electrical variety) to zinc (analytical chemistry). In solving analytical problems, they must bring to bear on the situation many streams of knowledge; in devising analytical techniques, they must be alert to the possible development of any device or means of measuring chemical reactivity or physical behavior into a means of determining composition.

In approaching an analytical problem, the analytical chemist must have the background and ability to evaluate possible analytical methods from the viewpoints of interference, range of applicability, necessary modifications, and preliminary treatment, as well as the valid interpretation of the experimental measurements obtained. He must know not only how to use the multitudinous analytical techniques at his disposal, but, perhaps more importantly, when to use them.

The analyst might be defined as the one who puts into practice the work of the analytical chemist, as the person concerned chiefly with the exercise of analytical chemistry. In many situations, the analytical chemist and the analyst are identical; each must always be something of the other. Both the analytical research chemist and his co-worker, the practicing analyst, have the same goal—knowledge of the composition and constitution of matter at the limits specified.

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THE analytical chemist today plays a more important part in an agricultural chemical research program than ever before. The rapid expansion of the chemical industry, with the accompanying development of a wide variety of new materials from agricultural sources, has made demands upon the analyst far greater than those of a few years ago. He is now expected to contribute much toward the evaluation of products and processes developed, regardless of their complexity.

The analytical problems, in general, deal with applied organic analysis for the establishment of the presence or purity of organic compounds and for the determination of material balances in new chemical processes. In the solution of these problems the analyst is required, through the use of either micro or macrotechniques, to determine by elemental or group analysis the purity of organic compounds and the composition of mixtures separated or synthesized from agricultural materials; to identify and measure the amounts of naturally occurring organic and inorganic constituents, such as starch, glycerides, sugars, tannins, pectin, rubber, protein, and ash, regardless of whether they occur in large or trace amounts; to be competent in the use of the special, as well as of the ordinary, instruments required in the analysis; and when necessary to develop new or modified analytical procedures.

Unfortunately, most college graduates are unable to qualify as analysts capable of performing even a portion of these duties. Instead, they must be trained on the job, with a consequent interruption of the research program. The prevailing misconception that all college-trained chemists are trained analysts must be corrected, with an accompanying change in the curricula of many of our colleges. The on-the-job training period could be largely avoided if the student analyst were to be given a coordinated analytical course which would include, in addition to the fundamental courses now offered, training in organic qualitative and quantitative analysis, applied organic analysis, including the principles for the estimation of constituents of agricultural and food products, and instruction in the use and application of analytical instruments now often available only to advanced organic and physical chemistry students. Sufficient training in physics must be given to enable the student to understand the principles and operation of the instruments used. Such a course will develop analysts with a broad general background who can quickly adapt themselves to the laboratory's problems. It will also keep the instruction of analytical chemistry progressive and based on current problems. Improved curricula, with a clarification of the requirements and duties of a modern chemical analyst, will do much to relieve the shortage of able analysts, since it will attract more and superior students to the field.

The profession of analytical chemistry in industrial agricultural research has grown up by demand, and the profession must now demand that the colleges provide analytical chemists.